Coaxial

Phase Shifter

ZXPHS-431-S+

50Ω 360° Voltage Variable 250 to 430 MHz

The Big Deal

- Precise 360° phase control
- Compact case (1.38 x 1.00 x 0.75”) with built-in base-mount bracket

CASE STYLE: BY493

Product Overview

Mini-Circuits’ ZXPHS-431+ is a coaxial voltage variable phase shifter providing precise 360˚ phase control from 250 to 430 MHz. This model achieves low insertion loss of 3.0 dB and good VSWR of 1.5:1. It has a control bandwidth of DC to 50 kHz and a control voltage range of 0 to +15V. The unit comes housed in a compact aluminum alloy case with SMA connectors and a built-in base-mount bracket.

Feature	Advantages
Low insertion loss, 3.0 dB typ.	Enables good transmission of signal power from input to output and minimizes effect on system noise figure.
Good VSWR, 1.5:1 typ.	ZXPHS-431+ provides good input/output matching for 50Ω systems.
Wide Phase Shift, 360°	In test environments, full 360˚ phase control allows the user to experiment with various incident phases. This can be used to test residual phase noise of amplifiers and to determine the influence of phase between two mismatched components in a system.
Small Case (1.38 x 1.00 x 0.75”) with built-in base-mount bracket	Save space in crowded layouts and facilitates easy mounting in customer assemblies.

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Generic photo used for illustration purposes only

CASE STYLE: BY493

Connectors	Model
SMA	ZXPHS-431-S+

+RoHS Compliant

The +Suffix identifies RoHS Compliance. See our web site for RoHS Compliance methodologies and qualifications

Maximum Ratings

Operating Temperature	-40°C to 75°C
Storage Temperature	-55°C to 100°C
RF Input Power	20 dBm max.
Control Voltage	20V

Permanent damage may occur if any of these limits are exceeded.

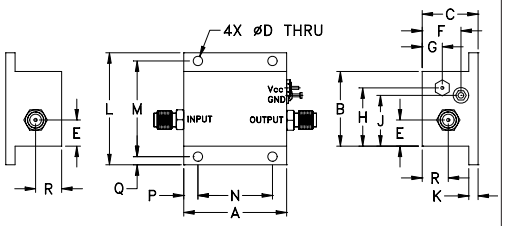
Features

- low insertion loss, 3.0 dB typ.
- wide phase shift, 360°

Applications

- signal processing
- military communication

Outline Drawing

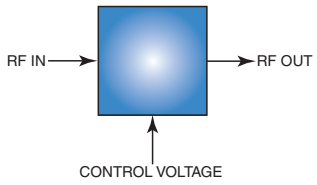


Outline Dimensions (inch / mm)

A	B	C	D	E	F	G	H
1.38	1.00	.75	.125	.35	.52	.27	.76
35.05	25.40	19.05	3.18	8.89	13.21	6.86	19.30

J	K	L	M	N	P	Q	R	wt
.66	.125	1.50	1.281	1.000	.19	.11	.35	grams
16.76	3.18	38.10	32.54	25.40	4.83	2.79	8.89	40

electrical schematic



Electrical Specifications at 25°C

Parameter	Condition (MHz)	Min.	Typ.	Max.	Unit
Frequency Range		250		430	MHz
Phase Range	250 - 430	360	—	—	Degrees
Insertion Loss	250 - 280	—	2.0	4.0	dB
	280 - 380	—	3.0	5.0	
	380 - 430	—	3.5	5.5	
Control Voltage	250 - 430	—	0-15	—	V
Control Bandwidth	250 - 430	—	DC-50	—	kHz
VSWR	250 - 280	—	1.25	1.7	:1
	280 - 380	—	1.50	—	
	380 - 430	—	1.75	—	

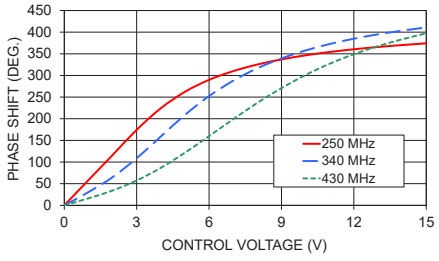
DC input resistance at Control port: 10000 ohms typ.

Typical Performance Data

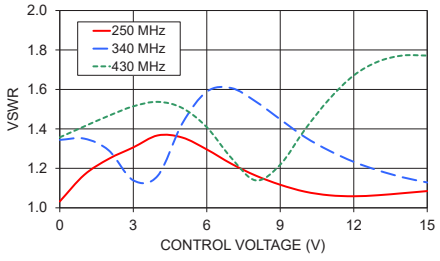
Control Voltage (V)	Phase Shift* (Degrees)			VSWR (:1)			Insertion Loss (dB)		
	250 MHz	340 MHz	430 MHz	250 MHz	340 MHz	430 MHz	250 MHz	340 MHz	430 MHz
0.0	0.00	0.00	0.00	1.03	1.34	1.36	2.22	1.88	1.68
1.0	58.21	30.50	16.21	1.17	1.35	1.41	2.61	2.15	1.86
2.0	116.05	65.01	34.17	1.25	1.29	1.47	2.80	2.47	2.09
3.0	174.47	108.80	57.36	1.31	1.14	1.51	2.85	2.87	2.40
4.0	224.23	158.95	86.60	1.37	1.16	1.54	2.75	3.31	2.82
5.0	262.24	208.82	121.57	1.36	1.43	1.51	2.48	3.56	3.32
6.0	289.89	252.38	159.97	1.30	1.59	1.41	2.19	3.49	3.79
7.0	310.00	287.84	198.87	1.22	1.61	1.25	1.95	3.23	4.19
8.0	325.33	316.64	236.73	1.16	1.54	1.14	1.77	2.95	4.43
9.0	337.03	339.27	270.72	1.12	1.45	1.22	1.65	2.70	4.52
10.0	346.51	357.78	301.13	1.08	1.36	1.40	1.55	2.49	4.48
11.0	354.19	372.72	327.16	1.06	1.29	1.55	1.48	2.32	4.34
12.0	360.48	384.89	349.10	1.06	1.23	1.67	1.42	2.18	4.15
13.0	365.76	394.99	367.69	1.06	1.19	1.74	1.38	2.07	3.94
14.0	370.23	403.46	383.44	1.07	1.15	1.77	1.34	1.98	3.72
15.0	374.20	410.91	397.35	1.08	1.13	1.77	1.31	1.90	3.52

* Normalized at control voltage = 0V

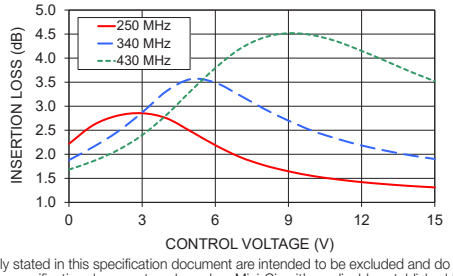
ZXPHS-431+
PHASE SHIFT



ZXPHS-431+
VSWR



ZXPHS-431+
INSERTION LOSS



Notes

A. Performance and quality attributes and conditions not expressly stated in this specification document are intended to be excluded and do not form a part of this specification document.
B. Electrical specifications and performance data contained in this specification document are based on Mini-Circuit's applicable established test performance criteria and measurement instructions.
C. The parts covered by this specification document are subject to Mini-Circuits standard limited warranty and terms and conditions (collectively, "Standard Terms"); Purchasers of this part are entitled to the rights and benefits contained therein. For a full statement of the Standard Terms and the exclusive rights and remedies thereunder, please visit Mini-Circuits' website at www.minicircuits.com/MCLStore/terms.jsp

PHASE SHIFTER ZXPHS-431+

Typical Performance Data

CONTROL VOLTAGE (V)	PHASE SHIFT* (Deg.)			VSWR (:1)			INSERTION LOSS (dB)		
	250 MHz	340 MHz	430 MHz	250 MHz	340 MHz	430 MHz	250 MHz	340 MHz	430 MHz
0	0.00	0.00	0.00	1.03	1.34	1.36	2.22	1.88	1.68
1	58.21	30.50	16.21	1.17	1.35	1.41	2.61	2.15	1.86
2	116.05	65.01	34.17	1.25	1.29	1.47	2.80	2.47	2.09
3	174.47	108.80	57.36	1.31	1.14	1.51	2.85	2.87	2.40
4	224.23	158.95	86.60	1.37	1.16	1.54	2.75	3.31	2.82
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8	325.33	316.64	236.73	1.16	1.54	1.14	1.77	2.95	4.43
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12	360.48	384.89	349.10	1.06	1.23	1.67	1.42	2.18	4.15
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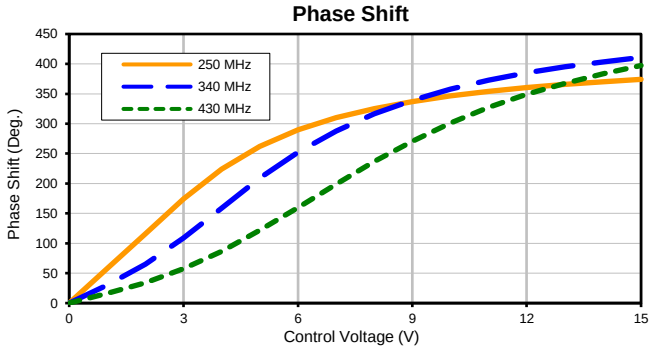
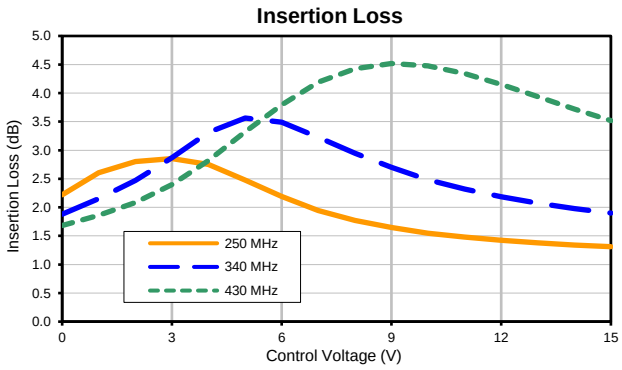
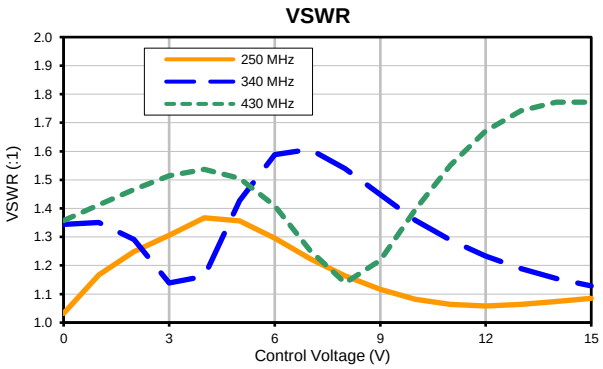
14	370.23	403.46	383.44	1.07	1.15	1.77	1.34	1.98	3.72
15	374.20	410.91	397.35	1.08	1.13	1.77	1.31	1.90	3.52

*Normalized at control voltage = 0V

Typical Performance Curves



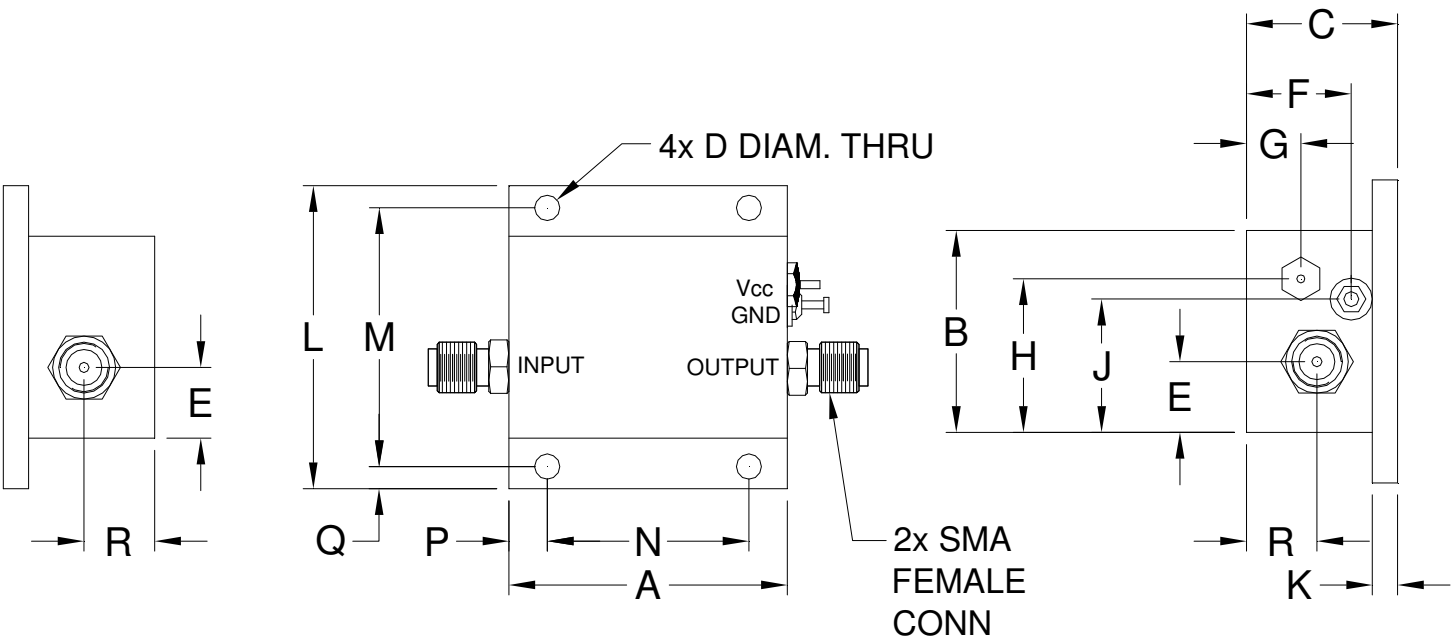




Case Style BY

Outline Dimensions

BY493



CASE#	A	B	C	D	E	F	G	H	J	K	L	M	N
BY493	1.38 (35.05)	1.00 (25.40)	.75 (19.05)	.125 (3.18)	.35 (8.89)	.52 (13.21)	.27 (6.86)	.76 (19.30)	.66 (16.76)	.125 (3.18)	1.50 (38.10)	1.281 (32.54)	1.000 (25.40)

CASE#	P	Q	R	WT. GRAMS
BY493	.19 (4.83)	.11 (2.79)	.35 (8.89)	40

Dimensions are in inches (mm). Tolerances: 2 Pl. ± .03; 3 Pl. ± .015

Notes:

1. Case material: Aluminum alloy.
2. Case finish: Clear chemical conversion coating, non-chrome or trivalent chrome based.

Mini-Circuits®
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Environmental Specifications ENV28

All Mini-Circuits products are manufactured under exacting quality assurance and control standards, and are capable of meeting published specifications after being subjected to any or all of the following physical and environmental test.

Specification	Test/Inspection Condition	Reference/Spec
Operating Temperature	-55° to 100°C Ambient Environment	Individual Model Data Sheet
Storage Temperature	-55° to 100° C Ambient Environment	Individual Model Data Sheet
Barometric Pressure	100,000 Feet	MIL-STD-202, Method 105, Condition D
Humidity	90% RH, 65°C Units may require bake-out after humidity to restore full performance.	MIL-STD-202, Method 103
Thermal Shock	-65° to 125°C, 5 cycles	MIL-STD-202, Method 107, Condition B
Vibration (High Frequency)	20g peak, 10-2000 Hz, 12 times in each of three perpendicular directions (total 36)	MIL-STD-202, Method 204, Condition D
Mechanical Shock	100g, 6ms sawtooth, 3 shocks each direction 3 axes (total 18)	MIL-STD-202, Method 213, Condition I